

REMARKS

Claim Rejections

Claims 1, 2, 6-9, 11, 15, 16, and 60 are rejected under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,665,968 to Meisburger et al.

Claims 3 and 5 are rejected under 35 USC §103(a) as being unpatentable over Meisburger et al. in view of Davis et al. and Lo et al.

Claims 4, 10, 12, and 14 are rejected under 35 USC §103(a) as being unpatentable over Meisburger et al. in view of Lo et al.

Claim 13 is rejected under 35 USC §103(a) as being unpatentable over Meisburger et al. in view of Petric.

Claims 1, 7 and 60 are amended to overcome the asserted rejections. All claims depending therein, by virtue of inherency, have also overcome the asserted rejections. As defined in the new claims, in our invention, the beam irradiated onto the object to be inspected comprises a multi-beam or an area-beam.

A multi-beam is formed, for example, by passing a single beam derived from a single emitter through a thin plate having a plurality of apertures formed therein, or by directly deriving a plurality of beams from a plurality of projections formed in a single emitter, as explained in pages 192-200 of the written specification and shown in Figs. 48-49.

Since the current density value of each beam may be retained at the same level as that in the case of a single beam being used, and the beams being separated from each other, the total current

for inspection may be increased by increasing the number of beams without causing limitation by the space charge limited effect, or without decreasing resolution or S/N ratio and, accordingly, it is possible to obtain a higher throughput for inspection.

An area-beam is a beam having a relatively large area, e.g. $100 \times 25 \sim 400 \times 100 \mu\text{m}^2$ as explained on page 91 lines 1-8, and page 26 lines 2-3 of the written specification. Such large area beam may be formed by, for example, focusing and diverging high current beam from LaB_6 chip by an electrostatic or electromagnetic quadrupole or octopole lens in X and Y axis to form an irradiation region having a rectangular or elliptical shape as explained on page 100 lines 3-15 of the written specification.

Since the current density value of the beam may be retained at the same level as that in the case of a single beam being used, the total current for inspection may be increased by increasing the area of the beam without causing limitation by the space charge limited effect, or without decreasing resolution or S/N ratio and, thus, it is possible to obtain a higher throughput.

Also, in this invention, as defined in the new claims, the image processing system includes a CCD (charge coupled device) or TDI (time delay and integration) image sensor.

That is to say, in this invention, secondary charged particles being emanated from the object are taken into CCD or TDI sensors as an optical image and output as electric signals. In this case, since the CCD or TDI sensors include a number of sensor elements or picture elements, it is possible to change an optical image to electric signals without any time delay even if the secondary electrons are emanated from the sample by the use of a multi-beam or an area beam. For example, in the case of a CCD image sensor, an intensity distribution of the secondary electrons on the

surface of the sample are converted into an electronic signal for each element or digital image data, and is output to a control section for forming an image. The CCD and TDI sensors are added to claims 1, 7 and 60, this patentably distinguish the claimed invention from the asserted prior art.

Thus, in this invention, for example, an inspection time of about one hour per 20 cm wafer has been accomplished, which is about 8 times faster than in the SEM method as explained page 26 lines 1-5 of the written specification.

Regarding these points, no reference discloses or suggests the use of a multi-beam or an area-beam for irradiating a sample for inspection.

All of the cited references adopts a so called SEM method (Scanning Electron Microscopy Method), wherein a single narrow electron beam having a diameter in the order of, for example, several tens to hundreds nm is used for irradiating a sample. Accordingly, as discussed in the text, there has been a problem in the prior art that the throughput for inspection is very low as explained on page 3 line 13 - page 5 line 8 of the written specification.

Also, no reference discloses or suggests adopting a CCD or TID image sensor in the image processing system.

In a SEM method, secondary electrons emanated from the sample are typically detected by a photoelectron multiplier tube or PIN diode. However, a detector speed of the photoelectron multiplier tube or PIN diode is much lower than that of the CCD or TID image sensor.

Accordingly, the inspection rate of the method adopted in the references is extremely low compared to the optical method of the present invention.

Regarding further differences between the present invention and the cited references, claim 2

defines that a carrying mechanism securely accommodates an object to be inspected. However, no reference discloses or suggests these features. Claim 3 defines that a working chamber and a loading chamber are supported through a vibration isolator. Lo, *et al.* teaches that a vacuum chamber is mounted on an active vibration isolation platform, not providing a vibration isolator between the working chamber and the loading chamber.

Claim 7 defines that a rough alignment is performed within a mini-environment space and, thereafter fine alignment in XY-direction and in a rotating direction is performed on the stage device. No reference discloses or suggests performing the rough alignment in the mini-environment space.

Therefore, the claimed invention are patentably distinguished over the asserted prior art. Allowance of the claims invention is respectfully requested.

Prior Art Indicated To Be Pertinent To The Disclosure

The Office has provided a list of prior art indicated to be pertinent to the Applicant's invention. Consistent with the understanding as stipulated in MPEP 706.02 that only the best prior art should be applied, this list of prior art not having been applied by the Office, it is the Applicant's understanding that the Office must have considered the listed prior art to be no more pertinent than the applied prior art of record.

CONCLUSION

In view of the aforementioned amendments and accompanying remarks, all pending claims are believed to be in condition for allowance, which action, at an early date, is requested.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 50-2866.

Respectfully Submitted,

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